Management Considerations of Natural Service Breeding Programs in Dairy Herds

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Introduction

Artificial insemination (AI) has proven to be a reliable technology for dairy producers to make genetic progress and control venereal diseases in their herds. However, despite these advantages many dairy producers prefer to use natural service (NS) as a component of their herds breeding program.[1 - 5] Producers that use NS believe that more cows can be bred by NS than AI because human errors in estrous detection are avoided when bulls are used. However, several studies have shown that this perceived increased in estrus detection and thus more cows bred when bulls are used, does not result in better reproductive performance when compared to AI.[4,6]

Dairy producers must consider that a successful reproductive program based on NS is dependent on fertile bulls that require proper management which can be labor intensive. In this manuscript, methods to manage NS breeding programs are discussed.

Management Considerations of Bulls in Natural Service Herds

Research on management strategies to optimize fertility in bulls used for NS in dairy herds is lacking.[10] Overton et al.[11] reported that recommendations to use NS bulls in dairies are made from research conducted on beef bulls and from experiences working with dairy clients who successfully manage bulls. The ability of a bull to impregnate cows is dependent on semen quality, libido, mating ability and social ranking among other bulls and females.[12] Therefore, a breeding soundness evaluation (BSE), as recommended by the Society for Theriogenology,[13] is fundamental and only bulls classified as a potential satisfactory breeder should be used. A BSE should be performed in all bulls prior to cow exposure and should be repeated every 6 months to determine whether or not bulls maintain their reproductive soundness during cow exposure over time. As a component of the BSE, testing for the venereal diseases trichomoniasis and campylobacteriosis (vibriosis) is highly recommended. Young bulls (2 to 2.5 years) should be used because of their temperament and lower risk for venereal disease transmission.[14] Young bulls should have achieved full puberty and sexual maturity, which occurs around 14 months of age, and should not be undersized in relation to a mature Holstein cow.

Bulls should undergo the same vaccination (except for brucellosis and *Tritrichomonas foetus*) and parasite control practices as cows. Control of venereal diseases is essential to the success of NS breeding programs. Cows should be vaccinated for Vibriosis at least 3 weeks prior to being exposed to bulls and receive a booster within intervals of 6 mo. Bulls can also be vaccinated for Vibriosis, with some success reported using twice the recommended dose for a

cow.[14] Vaccination is also available for *Tritrichomonas foetus* in cows. The bull to open cow ratio (BCR) is an important management factor in herds that use NS**.** Champagne et al.[1] reported that 53 % of California dairymen surveyed used bulls at the ratio of 1 bull per 30 or fewer non-pregnant cows. The most common BCR reported was 1:20 - 25 total cows in the pen. Although, the optimal BCR for dairy herds has not been evaluated, housing type and environment are important considerations. For dry lot or pasture dairies, the BCR is most likely 1 to 20, but for free stall dairies more bulls are recommended and a BCR of 1:15-20 has been suggested.[11] Because safety should be a major concern with bulls on dairy farms, those bulls that exhibit a bad temperament should be culled. Other safety precautions include the use of younger bulls and strict adherence to safety protocols.

An example of a bull management program developed by Dairy Production Systems of Florida (High Springs, Florida; http://dpsdairy.com) is shown below with their permission.

All new bulls:

All purchased bulls should be mouthed for age. Bulls older than 18 mo of age should be rejected. All bulls must weigh 700-800 lb at the time of purchase and each bull should have its own unique identification number.

- Perform a breeding soundness examination (**BSE**), test for trichomoniasis and test for PI BVD by ear notch method.
- Vaccinations:
  i. IBR/BVD/PI3 & BRSV (Modified Live Vaccine) + 5-way Lepto and L. borgpetersenii. Repeat initial vaccination in 3 weeks.
  ii. Clostridium 8-way
  iii. Vibrio (Oil adjuvant): Revaccinate with Vibrio vaccine every 3 months.
- Parasite Control:
- Deworm and Delouse: Repeat 3 weeks after first application

Current breeding bulls (exposed to lactating cows)

- All bulls must have a complete BSE every 6 months. After initial processing and clearance, bulls should be used for 6 months. After 6 months bulls should be re-tested and if satisfactory, they are used for another 6 months, after which the bull is culled.
- No bull is to be used in service for more than 12 months.
- Bulls receive BSE, trich test, revaccination for Vibrio each 6 months. Other vaccines are boostered in concert with the lactating herd.
- Bulls must be checked daily for lameness and any other health disorders. If a bull is lame should be removed from the herd and treated accordingly and replaced immediately by a sound bull.
- Keep a minimum of 10 bulls in the resting pen ready to relieve any ill or lame bull. (These additional "bulls-in-reserve" represent about 10 % of the normal working population.)
- Monitor attitude daily. Any bull that becomes aggressive or difficult to handle must be culled immediately.
- Check daily to make sure that bulls are in the correct pens and that bull-to-cow ratios are correct. Bulls should be rotated and rested after 14 d. Maintain 1 bull for every 20 open cows in each pen. After each palpation week, re-evaluate these ratios and adjust accordingly.
- Resting bulls receive the lactating cow TMR refusals (tends to be higher in fiber

and contains less cottonseed and energy as the original feed, but yet decreases the risks associated with wholesale ration changes)

In Natural Service Herds Palpate Early and Often

A NS breeding program allows for the implementation of important management practices such as a postpartum herd without bull presence with a designated voluntary waiting period. A postpartum herd allows for cows to be monitored daily for health, and sick cows treated promptly without the nuisance of having a bull present. The postpartum or herd also allows a well-balanced transition diet to be fed to help control metabolic or digestive disorders. Furthermore, $PGF_{2\alpha}$ can be administered to cows prior to being exposed to bulls to help synchronize estrual events.

In cows bred by NS, accurate estimation of gestation length may be difficult and results in cows not receiving an appropriate dry period which can affect cow performance after calving. The length of the dry period was associated with udder health, culling, and overall performance during early lactation.[15] Extended dry periods of 143 to 250 days increased the likelihood of subclinical mastitis during early lactation and had a negative impact on reproductive performance. Short (0 to 30 d) and extended (90 days) dry periods had a detrimental impact on early lactation and 305 milk yield and increased the risk of overall culling when compared to a conventional dry period of 53 to 76 days. Estimates of days pregnant obtained from palpation are reliable from 32 to 90 d. Assuming that a pregnancy diagnosis of 32 days is the earliest that can be performed, the interval between exams of non pregnant cows should not be greater than 60 days. In this manner, a cow that is less than 32 d pregnant and is diagnosed non pregnant would be between 61 to 91 days pregnant when reconfirmed 60 days later. The date of the last examination at which the cow was diagnosed not pregnant is important information for estimating gestation length. Cows that are found to be cystic can be treated with GnRH; use of $PGF_{2\alpha}$ should be limited only to cows with pyometra. To monitor the presence of trichomoniasis in a herd, some practitioners have found it beneficial to re-confirm pregnant cows between 90 to 120 d of gestation.[16] Abortions due to *Tritrichomonas foetus* occurs during the first trimester of gestation and rarely after 5 months of gestation.[17] Pyometra may be present in up to 10 percent of the cows in an outbreak of trichomoniasis.[17] Therefore, it is strongly recommended that during routine reproductive examination, cows diagnosed with pyometra should be cultured for *Tritrichomonas foetus*. Trichomonad pyometra is post-coital and not postpartum and occurs after death of the developing embryo or early fetus.[17] Pregnancy in cows should also be reconfirmed prior to dry off similar to the practice used in AI herds.

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